**Title:** A Solar Community

**Content Area:** Science

**Grade Level:** 8th Grade

**Time:** Ten 45 Minute Class Periods

**Standards:**

*Performance Indicator 4.1* – Describe the sources and identify the transformations of energy in everyday life.

*Standard 2.1.1* – Use a range of equipment and software to integrate several forms of information in order to create good-quality audio, video, graphic and text-based presentations.

*Common Core 8*.*W.4* – Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.

**Lesson Objectives:**

1. The student will be able to compare and contrast the benefits and consequences of alternative energy sources.
2. The student will be able to develop a persuasive proposal for a building to begin using an alternative energy source.
3. The student will be able to gather and analyze scientific data by using a database.
4. The student will be able to model a completed circuit using different energy sources.

**Procedure:**

*Note: The following is a series of lessons that should be embedded throughout the assessment,* A Solar Community*. The students should receive a copy of the assessment document on the first day, and should be aware of the product and series of activities that lead to the assessment.*

1. Anticipatory Set - (5 minute free write w/ 10 minute share-out)
   1. Writing Prompt:
      1. When you hear the word *energy*, what comes to mind? Your goal should be to write for 5 minutes and/or one page
   2. Allow time for group share-outs and full class share-outs
2. Energy Inventory – *Adapted from Solar One Curriculum (The Green Design Lab) – (Two 45 Min. Class Periods)*
   1. In order to gather background information on TYWLS-Astoria’s energy usage, students will complete an energy audit of the school. Please see pages 4-7 for the student worksheet.
   2. The teacher will need to guide students through the building, and will need to model how to use a kilowatt meter before the audit.
   3. Students should make predictions about the amount of money and/or energy the school uses each day, month and year.
   4. The teacher should lead a discussion about how the results compare with the students’ predictions.
   5. Materials needed:
      1. Kilowatt Meter
      2. Solar One Energy Audit Form
      3. Access to Light Fixtures, computers, SmartBoards and other electronic devices
   6. *Note: If access is difficult, the students can audit the classroom instead of the entire school. They can also use the classroom results to estimate the school’s usage.*
3. Batteries vs. Solar Panels – *(One 45 Minute Class Period)*
   1. Students will complete a circuit using an 8-volt battery. Their goal will be to light a holiday light bulb.
   2. After completing the holiday light circuit, students will try to use a solar panel to light the holiday light.
   3. The teacher should lead a discussion regarding what the students will learn. It is the goal of the teacher to facilitate the students understanding of the potential of solar panels, as a replacement for a traditional source of electrical energy.
4. New York City Solar Map – [*(nycsolarmap.com)*](http://nycsolarmap.com/) *– (Two 45 Minute Class Periods)*
   1. Once the audit has been completed, introduce the idea of alternative energy and solar panels
   2. Students will use the *NYC Solar Map* to determine the solar panel potential of the school building.
   3. The students will learn about the total cost, potential savings, carbon emissions reductions and a comparison of the number of trees.
5. Solar Panel Benefits and Consequences Articles *– (Two 45 Minute Class Periods)*
   1. A part of research is to gather information, facts and data from outside resources. Students will be able to access articles, such as the one’s below, from the [New York Public Library’s](http://www.nypl.org/collections/articles-databases?subject=&location=&audience=914&language=&keyword=&limit=) database.
   2. The students will find one article, read the article, and highlight 4-5 pieces of information that identify the benefits and consequences of using solar panels.
   3. After reading their article, students will share what they have learned with their group members.
   4. Article Samples
      1. [*Harnessing the Sun*](http://web.ebscohost.com/srck5/pdf?vid=4&hid=105&sid=00707b37-218d-4975-8f11-8b2793f903fd%40sessionmgr4)
      2. [A Source of Sunny Optimism](http://web.ebscohost.com/srck5/detail?vid=3&hid=8&sid=00707b37-218d-4975-8f11-8b2793f903fd%40sessionmgr4&bdata=JnNpdGU9c3JjazUtbGl2ZQ%3d%3d#db=mih&AN=48717016)
6. A Solar Community *– (Three 45 Minute Class Periods)*
   1. Through the research outlined above, students will write a proposal to the Board of Education and the City Council asking for support and funding for the installation of solar panels at TYWLS of Astoria.
   2. Students will be able to choose the type of media (writing, iMovie, PowerPoint, Prezi, etc.) to present their findings.
   3. *Note: An extension for this activity would be to bring in community members (i.e. parents, local councilperson, business leaders) for the presentations.*

**Assessment:**

A Solar Community - *See below.*

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

A Solar Community

**Background**: For thousands of years, humans have been awed by the Sun. This yellow, glowing ball in the sky has provided warmth, light and energy for all living things on Earth. Humans have wanted to harness the Sun’s energy for a very long time, and to do so, would provide a source of amazing and sustainable energy. Best news of all…the technology is finally catching up with scientists’ dreams of using this energy!

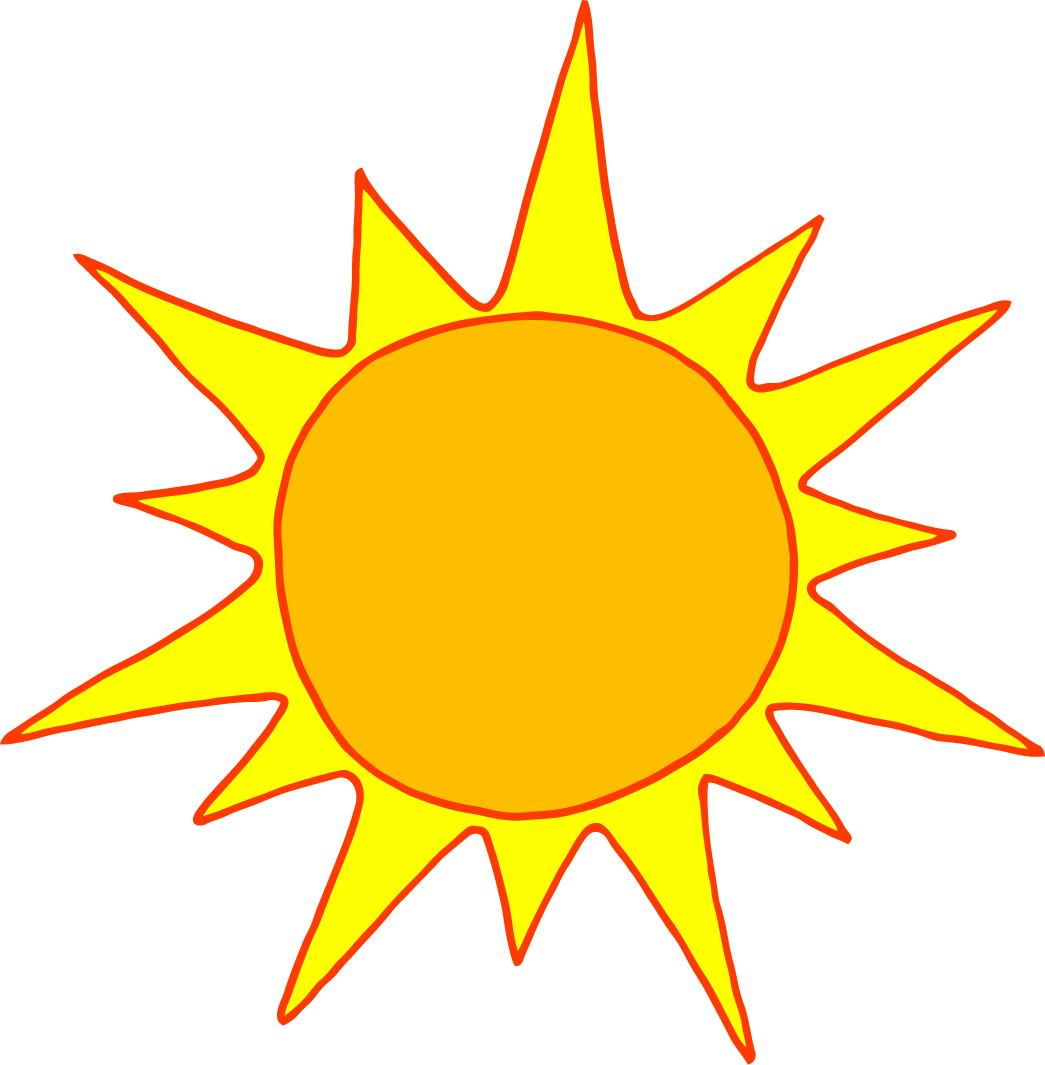
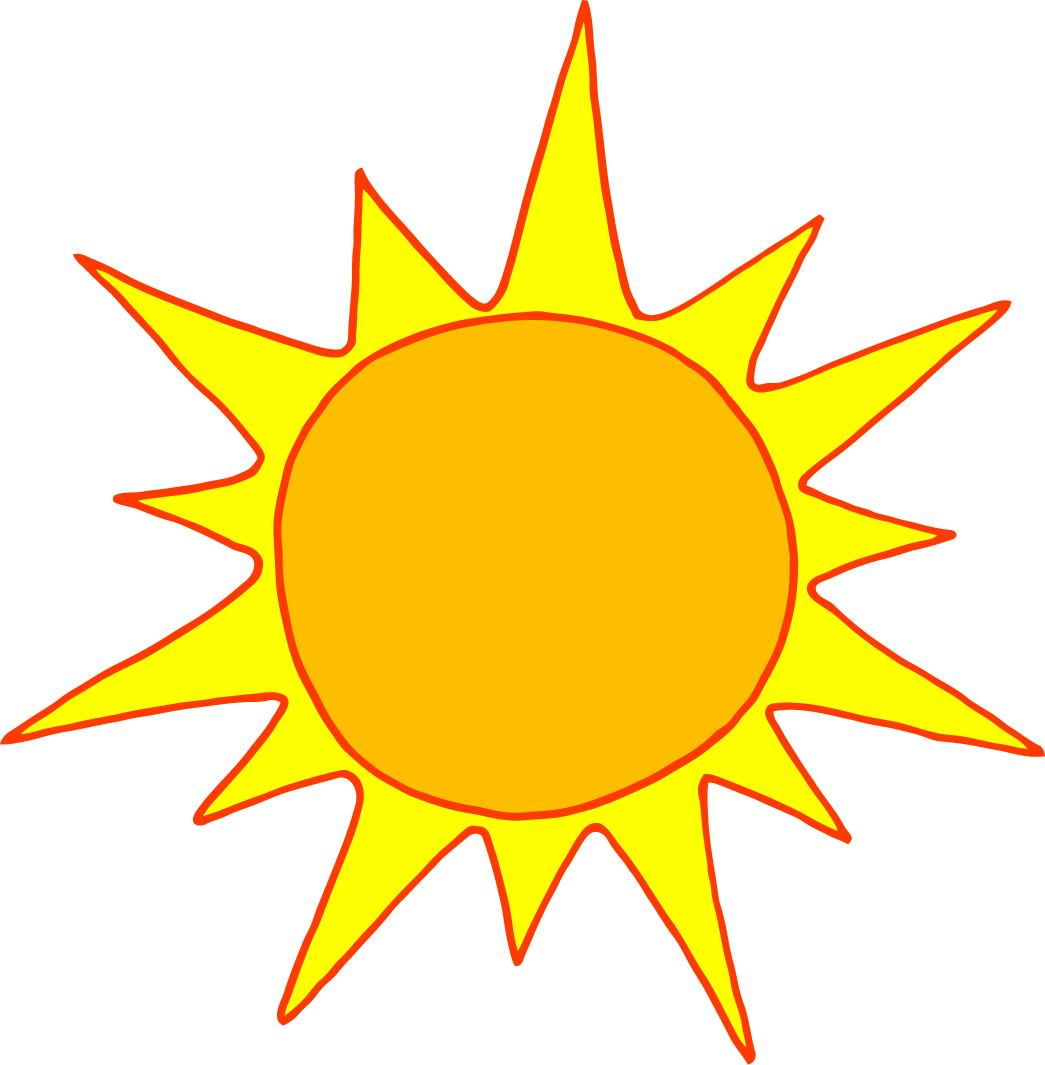
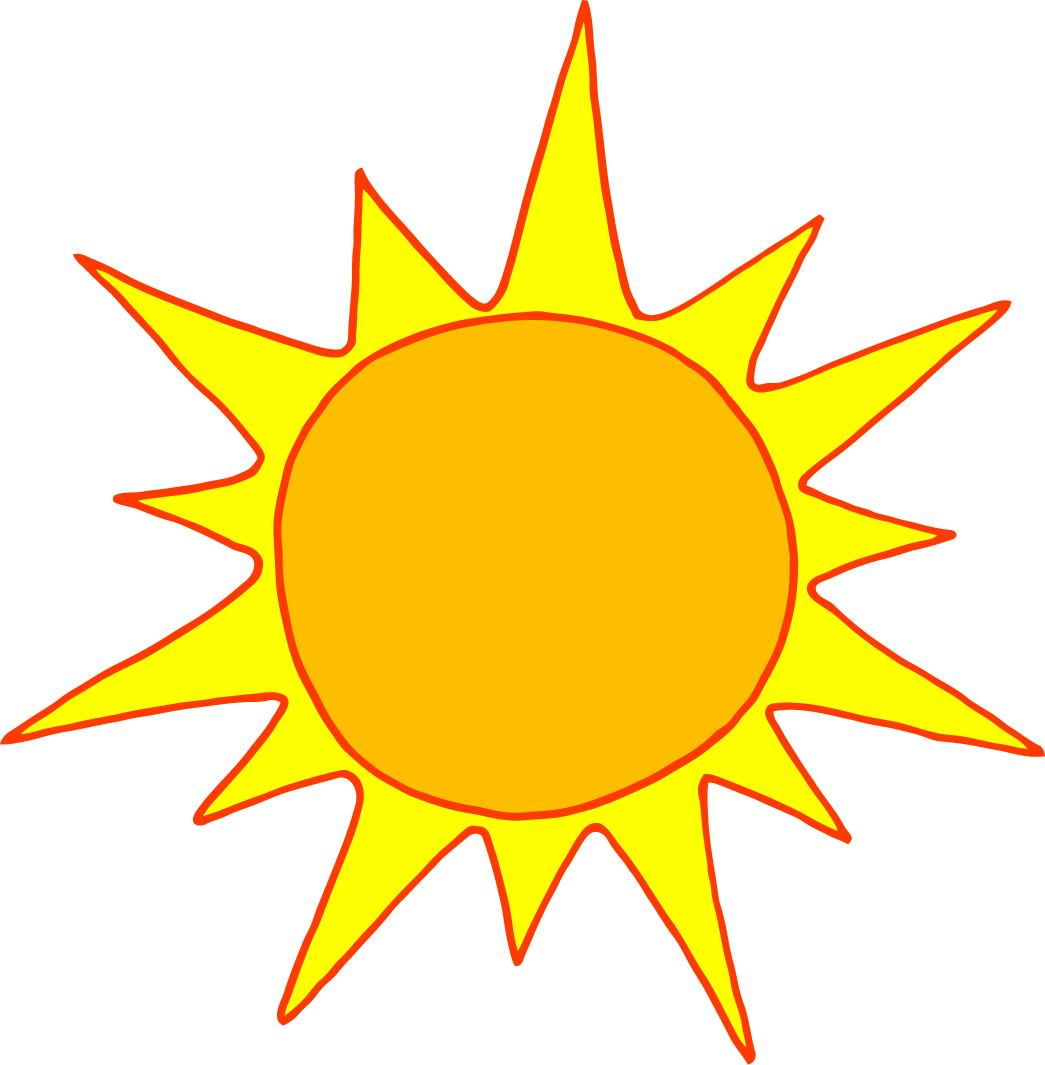
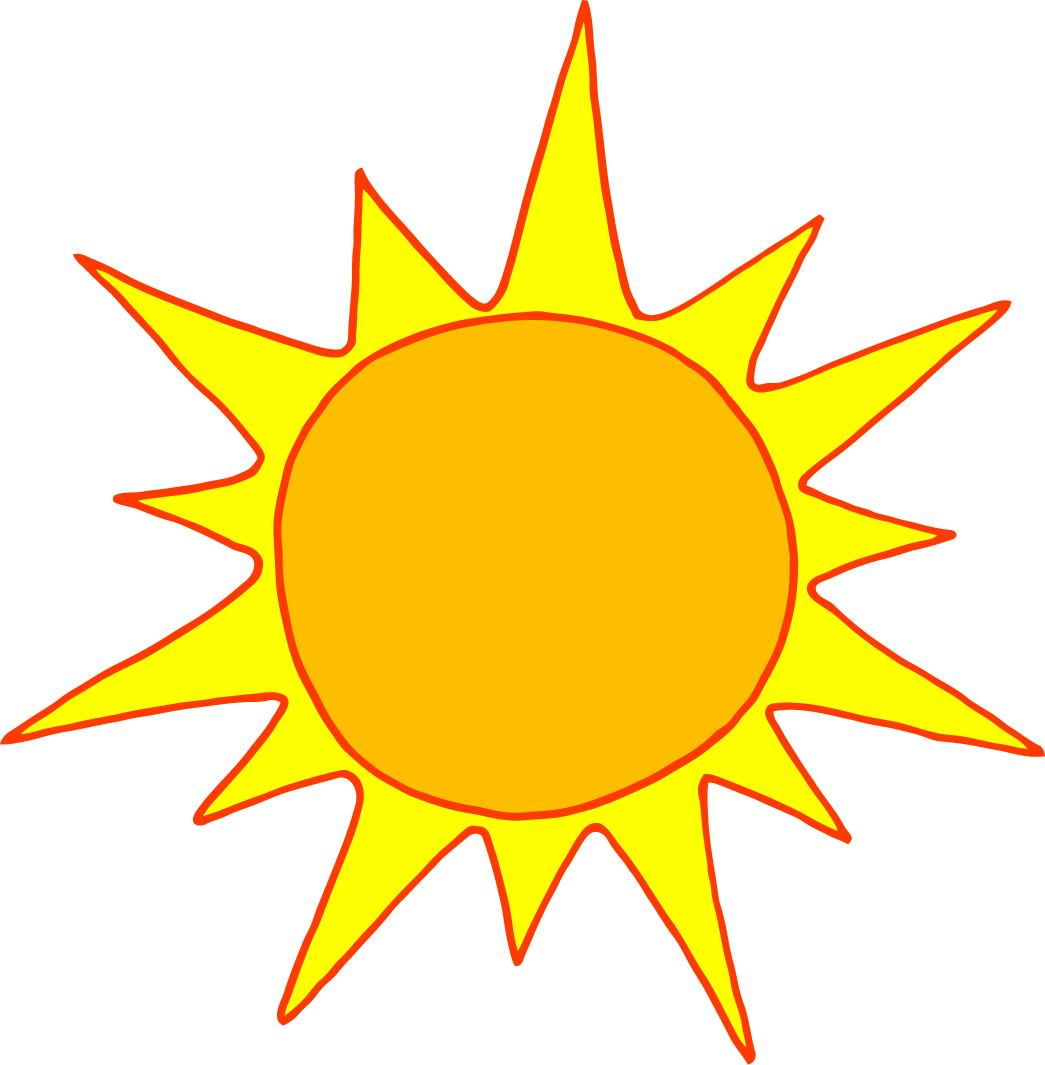
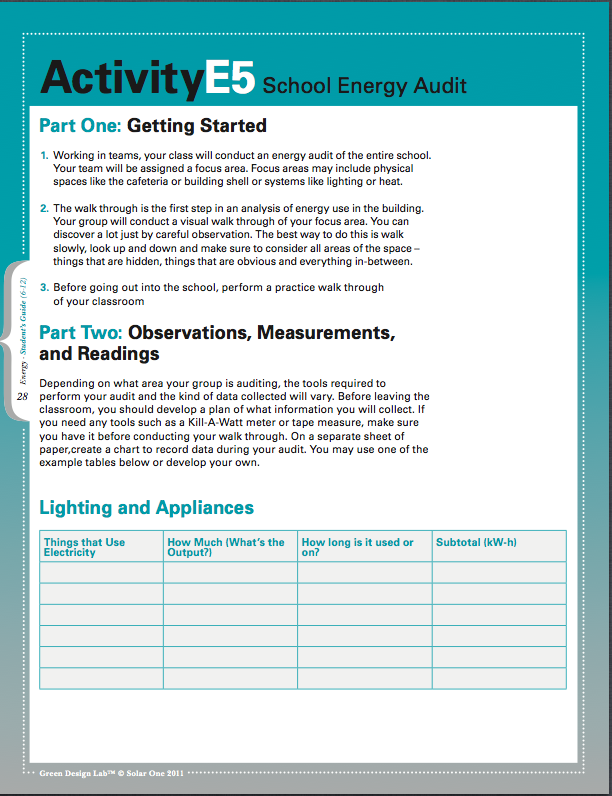
**Task:** The TWYLS-Astoria community is very interested in the possibility of installing solar panels on the roof. It will be your group’s task to persuade the Board of Education and the City Council to approve and fund this project.

**Things to Consider:**

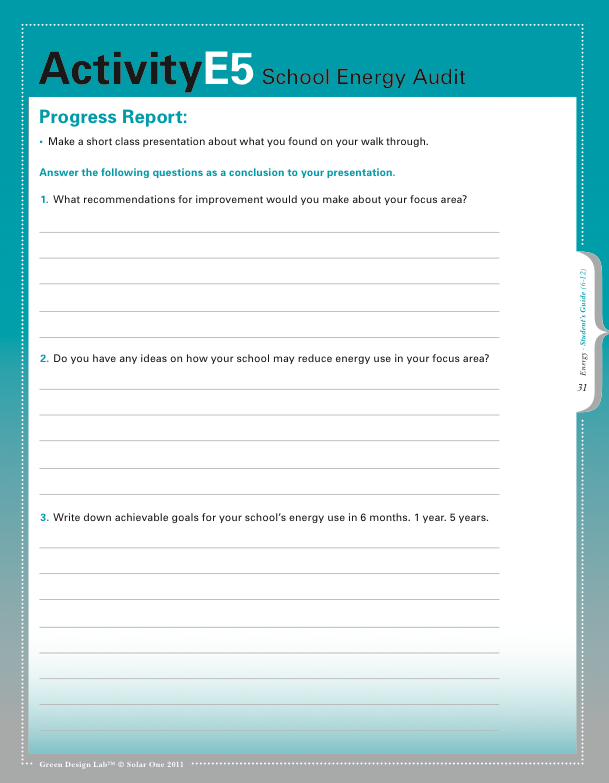
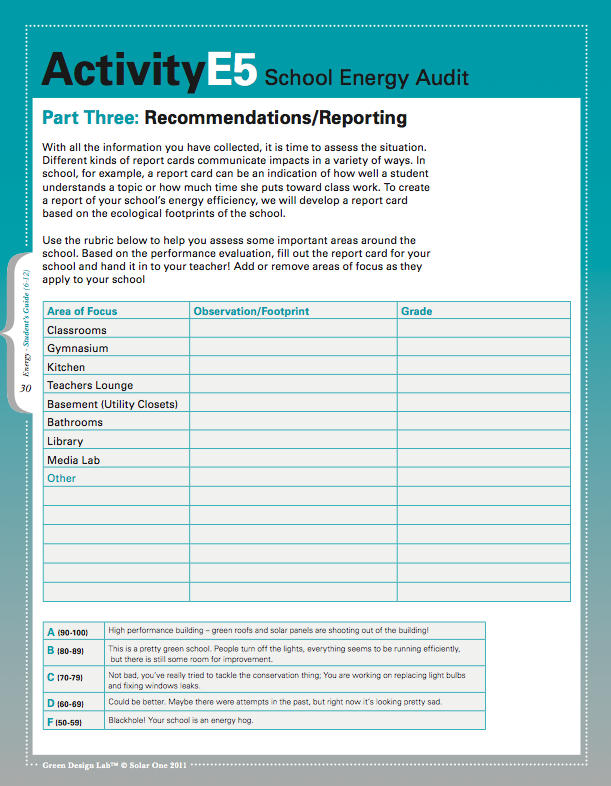
* What is the current energy used by TYWLS-Astoria? How much does it cost?
* What is the Solar Energy potential of TYWLS-Astoria?
* What are the benefits of Solar Energy?
* What are the cons of Solar Energy?
* What is the best medium(s) to use in order to persuade the councilmembers?

**Rubric:**

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| --- | --- | --- | --- |
| OUTCOME | NY CRITERIA | MS CRITERIA | ES CRITERIA |
| *Compare and Contrast the benefits and consequences of Alternative Energy Sources* | I am unable to provide or explain the benefits and/or consequences of alternative energy sources | I am able to explain 2-3 benefits and 2-3 consequences of using alternative energy sources | MS Criteria **AND** by providing specific examples or scenarios of the benefits and consequences |
| *Communicate scientific information and ideas clearly and effectively, while adjusting to different audiences and purposes* | I am not able to provide or develop my thoughts or evidence to explain my understanding **OR** I am not able to include correct spelling, grammar and punctuation | I have used the TIED format while writing **OR** has *introduced* the *topic*, and provided *evidence* that explains and *develops* their writing **AND** includes correct spelling, grammar and punctuation | I can articulate my thoughts and ideas in new and innovative ways while using vocabulary, correct grammar, spelling and punctuation. |
| *Explain patterns within a chart, graph, and/or diagram* | I am unable to use collected data in a way that supports my argument or claim | I am able to interpret collected data, and use the data to support my argument or claim with the guidance of the teacher | I am able to interpret collected data, and use the data to support my argument or claim in a unique or creative way without the guidance of the teacher |

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**Danielson Framework:**

*Competency 1e: Designing Coherent Instruction*

*Competency 3c: Engaging students in learning*.

***Lesson Reflection:***

I designed this lesson to engage students and to provoke their thoughts regarding alternative energy sources. Students often hear about solar power, wind energy, “fracking” and other forms of energy when they read newspapers or watch TV, and are interested in energy sources, both alternative and traditional. This project is meant to deepen their understanding of the topic. By researching the benefits and consequences of using solar panels, students will gain a better understanding why buildings, homeowners and businesses do not automatically convert to solar power. It is difficult for politicians and other officials to make decisions, and this discussion and research will lead students to the understanding that solar power has its benefits, but that it also has its consequences. A homeowner, business owner or city official needs to understand the benefits and consequences of all decisions, and the proposal that students will create will educate others on the use of Solar Panels.